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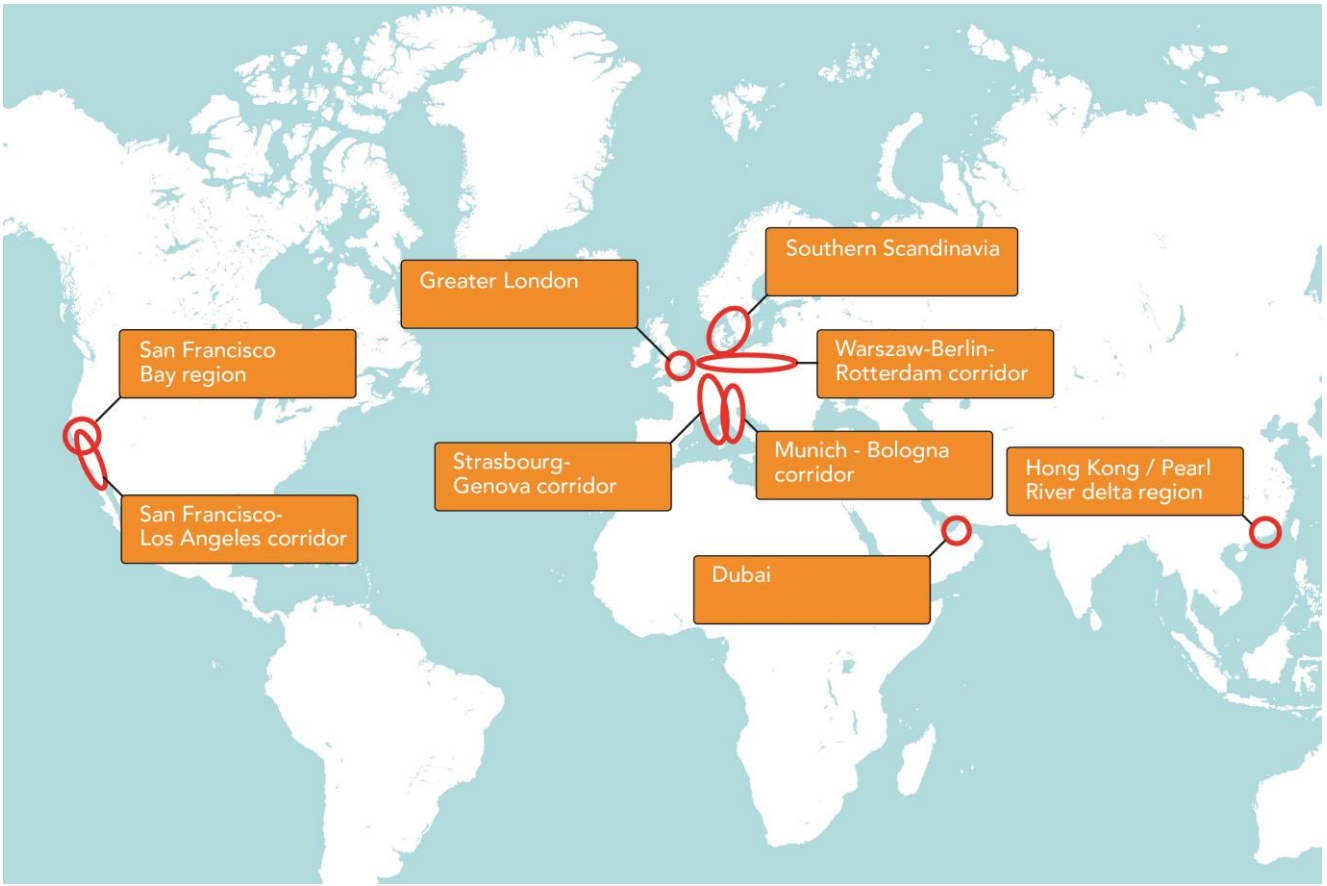
The Fehmarnbelt link will be a growth dynamo for the Baltic Sea Region

***By Christian Wichmann Matthiessen**, Professor of Geography at the University of Copenhagen* *Follow-up on "The Fehmarnbelt Fixed Link - Regional Development Perspectives" from 2011 (ISBN-13 978-87-92416-15-5), prepared at the request of Femern A/S.*

When major missing links are replaced with fixed links, the world changes. This often includes investments whose physical expression in the form of bridges, tunnels and land facilities has dimensions with global ramifications. The decision on the major investments in fixed links across southern Scandinavia was taken by far-sighted politicians, first Danish, then Swedish and latterly German. They had faith in the future and have so far been proved right. To transform southern Scandinavian missing links into fixed ones and thus connect the Scandinavian peninsula with the continent of Europe is a world-class project costing hundreds of billions of kroner. And it is a project that is well on the way to success. The missing links project is related to a handful of other major dynamic development projects, which will mean that this part of the world will be transformed. Such hotspots include a number of metropolitan regions and European cross-border corridor development.



Improved infrastructure such as new fixed links and railway lines, contributes significantly to the development of and across the metropolitan regions.

London is focusing on Crossrail. This is an underground rail link costing approximately DKK 160 billion linking Heathrow Airport, the City financial centre and Docklands Airport with stops at major railway stations. The project has the ability to trigger new specialisation by allowing a greater concentration of subcontractors and labour. Approximately 70 per cent of the anticipated benefits equate to travel time, while the remaining 30 per cent are dynamic effects, especially in the form of new economies of scale and new specialisation in London's financial centre.

Then there is the San Francisco Bay Area, where a new regional railway is being developed with connections to Silicon Valley, and a high-speed rail line to Los Angeles is also planned. New bridges across San Francisco Bay represent opportunities for greater concentration, thus enhancing the quality of an already highly qualified labour market.

In Dubai, the world's largest airport is in place, and the same is true of the world's tallest building. It is a question of creating a major transport HUB for traffic between Europe and Asia, but also to attract new quality business. The Emirates Airline's success goes hand-in-hand with Dubai's speculation. Furthermore, other wealthy, neighbouring Arab cities such as Doha and Abu Dhabi are pursuing a similar strategy.

Around the Pearl River Delta in China, city leaders are aiming to create a contiguous urban centre with more than 40 million inhabitants. In just six years, approximately DKK 2,000 billion will be invested in infrastructure in order to create a functional urban region, and a high-speed rail line to the neighbouring city of Hong Kong and its almost 10 million inhabitants is envisaged.

Europe's transport network

The European "Trans-European Transport Networks" takes in a range of corridors to be developed with infrastructure, but where the intention is also market development. The network is a prerequisite for Europe's internal market continuing to evolve, but it is also central to which networks the major urban cities are included in.

A good example is the corridors between northern Europe and Italy, where Switzerland or Austria can expect major facilities, while cities like Milan and Munich become hotspots.

The corridor from the Baltic countries via Warsaw and Berlin (with the new Intercontinental Airport) to Rotterdam is another example. Crosspoint cities can expect new development.

What all of these projects have in common is that they not just about transport links, but that they create new urban regional conditions. They also have development and learning projects in common and not simply infrastructure investments alone.

The Fehmarnbelt link is one of the trans-European transport network's "missing links".

The concept of "The European Missing Links" was formulated in the 1980s by, among others, "The European Round Table of Industrialists". It designated 14 corridors on this side of the former Iron Curtain, where the continent lacked strong transport lines, and where the systems on the two sides of mountain ranges or waters simply could not interact as a result of the respective barriers' strengths. With the Iron Curtain, several missing links were put on the agenda and, with the EU's dedicated network policy, there is increased focus on the networks' weaknesses and barriers to traffic and transport.

South Scandinavian missing links. The map is designed so that distance between the Zealand archipelago and the rest of the world is measured in time.

When the missing links concept was formulated, it was about long-distance traffic and especially freight transport. The project is still about this, but there is also the fact that fast passenger transport for business people and tourists creates requirements for the overall transport network and requires barrier-free connections. Furthermore, it can be observed that the realisation of the dynamic effects of investments in recent years have been put on the agenda.

Infrastructure creates a completely new stage

Infrastructure has the ability to create a new stage on which the development of society can take place. In the group covering the three southern Scandinavian links, the scene change involves potential dynamic effects. These effects are everything that happens around the link itself when the market and society change and adapt to new improved conditions.

The dynamic effects of the tunnel under the Fehmarnbelt will enhance the potential of cities on the international stage. It is about the development of functional, cross-border urban regions where new economies of scale can be established and new specialisations developed, with all that implies in terms of new value growth. These opportunities must be taken. If the potential is to be reached, it must be realised through decisions and organisation. Far reaching political decisions are required to implement the cross-border project. Politicians must dare to believe in the vision of a coherent northern Germany-Øresund region and growth centre and a strong partnership between cities. The necessary decisions need to be taken so that the opportunities and benefits of working together are

optimised.

The Fehmarnbelt link and its approach facilities form phase three of the huge development project that connects the Scandinavian peninsula with the European continent. First came the Great Belt Link in 1997/1998, then the Øresund Link followed in 2000. More than 20 years after that, the tunnel under the Fehmarnbelt will follow, which removes the last of the three missing links that connect the Scandinavian peninsula directly to the mainland of the European continent.

Southern Scandinavia with fixed links. The map is designed so that the distance is measured in kilometres.

The Great Belt Link

Phase one of the southern Scandinavian project was the fixed link between Funen and Zealand, which opened in 1997/98. This transformed Denmark. The country had grown up, in many respects, as two distinct logistics systems then, almost overnight, Denmark was transformed into one system, with all logistics having this as the basis.

The railway across the Great Belt has saved long-distance rail traffic in Denmark. In the 1990s, many believed that it was under threat. The railway and motorway links between the country's major cities have led to face-to-face meeting activity increasing considerably, with participants able to sleep in their own beds on both the nights before and after the meetings. Day-trip tourism and family visits have increased in frequency, while more and more people commute across the belt. On the other hand, domestic aviation has dramatically reduced with a number of routes being dropped, and only the routes between Copenhagen and Aalborg, Karup and Rønne apparently secure. Ferries across the Kattegat have seen strong competition and lost ground. In addition, the old ferry towns of Nyborg and Korsør lost their function as traffic hubs once the bridge and tunnel builders had packed up and left.

It was a shock to the towns' economy, which, however, was partially mitigated by the Danish government moving the Copenhagen naval base to Korsør as a result of local lobbying. The Great Belt fixed link created an immediate traffic jump across the belt and traffic has now tripled in comparison to the numbers on the ferries. In part, this traffic has transferred from the other routes and forms, but the bulk represents new interaction.

Why this success now? It is due to the fact that the country was already bound together by family ties, corporate internal and external interaction, organisational conditions and the state apparatus. And when the land-sea barrier was eliminated, it was simply about exploiting the new opportunities. Mobilisation of political decisions and skills was largely unnecessary, because all understood the potential of change. Since then, all localisation decisions have been taken in that light.

The Great Belt fixed link changed the scene for urban and regional development players. In particular, it meant strengthening the triangle region as the main Danish crosspoint and gave the greater Copenhagen area a stronger national position. In addition, it meant a more powerful localisation pressure for the Copenhagen-Århus corridor, where, however, Odense's development fell into the shadow of Copenhagen somewhat. The cities that lost their air route to Kastrup suffered, as did the ferry towns with declining traffic, especially Nyborg and Korsør, which experienced a loss of quality.

Nyborg and Korsør (which are now a part of the Slagelse Municipality) have not got very far with regard to local integration and interaction across the Great Belt. The total working population (i.e. in terms of jobs) in the current Great Belt link municipalities is approximately 43,000 people, of whom approximately 11,000 work in Nyborg Municipality and 32,000 in Slagelse Municipality (2013). Around 250 commute between the two municipalities. This is more than before the bridge, but not a particularly large figure. By comparison, approximately 34,000 people work in Nyborg plus Svendborg municipalities. Around 1,100 commute between the two areas. One of the reasons for the somewhat weak development in the local interaction across the Great Belt is that there has been no mobilisation of local areas in the form of joint initiatives.

The Øresund link
Just two years after the Great Belt fixed link was completed, Denmark and Sweden opened the fixed link across Øresund. Phase two of the southern Scandinavian project was built between two metropolitan regions, greater Copenhagen and Malmö-Lund, because a number of analysts assessed that the Øresund link was not only about long-haul traffic, but also had potentially huge effects on the interaction between large cities. In addition, came the dynamic effect that resources could be utilised in an overall urban system.

When the Øresund link was completed in 2000, it led, in Denmark, to the construction of a new motorway between the overall European network and the bridge, and a new railway from Copenhagen Central Station via Copenhagen Airport Station and on to the link. In addition, a metro line was built from the city centre to the airport and from the city centre out through an upcoming new district at West Amager. This district is now well on the way to being properly realised.

In Sweden, the Malmö motorway was extended to the link. The same was true for the railway in the form of a circle line, which has since been supplemented by a direct tunnel connection from Malmö Central Station to the bridge. Also in Malmö, the facilities have pulled urban development along with them, especially around the first Swedish railway station and the first motorway junction after the bridge, where the Hyllie district is expanding. Furthermore, other parts of Malmö are newly developed: Triangeln and the old port areas. Also, the development of Lund is one of the outcomes of the Øresund Bridge, above all in the form of the planned construction of the world's strongest neutron source, the European Spallation Source, where research into the sub-atomic will lead to innovation on a large scale.

The Øresund Bridge has had other effects than simply to justify a transformation of the overall transport infrastructure and changing cities' localisation development. It has also had a range of dynamic effects. First and foremost, it has changed the boundary area between the Copenhagen and Stockholm city product, and has extended Copenhagen to encompass southern Sweden, where business-to-business service and terminal functions have been boosted. Currently, for example, southern Swedish air freight flies out of Kastrup, where before the link it had gone via Stockholm or Gothenburg.

City competition is not just Nordic, it is global. The overall urbanisation around Øresund is the Nordic countries' largest, and also has a significantly heavier catchment area than the second biggest, which is Stockholm. This can be seen from an international viewpoint and in addition, marketing organisations, such as Copenhagen Capacity, are willing to help companies and organisations open their eyes to the possibilities.

The Øresund fixed link has strengthened the crosspoint that was already most significant in Scandinavia. This applies to the concentration of road and rail traffic and to maritime transport – at least, when the traffic through the Great Belt is included. It applies foremost to Copenhagen Airport, which is the strongest intercontinental and international air traffic junction in this part of Europe. The airport in Kastrup plays a major role in Greater Copenhagen and Scania. It is estimated that approximately 60,000 jobs are directly or indirectly linked to the airport's operation. It offers direct access to many major cities and to international and intercontinental markets.
An additional dynamic effect of the fixed link across Øresund is the raising of the specialisation profile from its grounding in Greater Copenhagen's one million professional employees to include an

additional half a million in southern Sweden. The metropolitan area around Øresund comprises more and qualitatively heavier businesses than it did before the link. The rationale behind achieving dynamic effects is partly the new overall size and thus the possibility of achieving economies of scale and greater market access, and partly the integration of elements of the two communities, where cross-border movements and commuting constitute one dimension, while the establishment of joint activities, for example Copenhagen-Malmö Port another. It is about exploiting the area's resources as a whole, and thus achieve further economies of scale.

It took time to get the Øresund Region development project started. In spite of the many ferries, there had been negligible interaction between the Danish and Swedish urban areas either side of Øresund. For example, only about 2,000 commuted across daily – today the figure is approximately 18,000; while relocations before the link only numbered around 1,500 against the now well over 4,500 annually. The integration process was slow because Øresund was not only a land and sea barrier, it also represented a number of other barriers. The peoples did not know each other, either in family terms or when it came to businesses and municipalities. Language differences were a hindrance and the regulatory systems differed significantly. It was simply a learning process where understanding the potential opportunities and benefits had to come first, before looking to exploit them. Integration began to accelerate, however, at first driven by differences since by interaction. Since the link opened in 2000, car traffic across the Øresund has doubled.

The Øresund Region has made good progress over the last decade, but it could have gone better. Great political courage was shown in Denmark and Sweden, when the expensive decisions on the construction of the fixed link were taken. This was also the case with the decisions on the connecting landworks and about transforming urban development and equipping new districts with modern public infrastructure. When it came to integration, the courage was not so visible however, and it is clear that none of the states would entrust decision-making power – let alone the economy – to a cross-border project. This was limited to establishing a committee: the Øresund Committee, which has to reach agreement on decisions, and where the scope for action is to cooperate at the lowest possible level. This has been achieved as well as the conditions have allowed, and good results have been achieved.

In addition to the Øresund Committee, many other partnership agencies across Øresund have been set up, some of which have since been discontinued. Some are successes, Medicon Valley Academy, for example, while others have failed. First and foremost, we saw that the high-profile university collaboration, Øresund University, suffered an early demise, because the universities would not commit their own resources to joint ventures, and because politicians and academics did not trust each other. Øresund Science Region is another example of how good intentions are not enough. The organisation is dead and buried, although some of its activities have survived.

Moving on from unexploited opportunities and poor optimisation to the development of urban areas around Øresund, it can be observed that both Copenhagen and Malmö are cities transformed from how they were 25 years ago. Both were once marked by pessimism and lack of faith in the future. Growth and construction had dropped off the agenda. Industry was reduced to a fraction of its former greatness and, although there was new activity – for example in media, information technology and business services – urban development was poor, with new jobs being created primarily within the public consumer service.

Pessimism has now turned to optimism and belief in the future. Cities have changed with new districts and new infrastructure. The old quarters have changed character and have been energised. Redevelopment and regeneration have led to improvements in quality, and companies represent international service centres combined with the production of high quality goods. Michelin has awarded stars, and Copenhagen has been named the best city in which to run a business. Malmö has also changed and has been boosted in the Swedish city hierarchy.

The Fehmarnbelt Link

Now phase three is on the way and, here too, politicians have shown courage and decided to build a fixed link between Lolland and Fehmarn. Denmark is also overseeing the creation of landworks to Rødby. This concerns the construction of a new dual track railway from Copenhagen to the tunnel, where trains are to run on an electrified track designed for speeds of 200 to 250 kilometres per hour.

As part of the state treaty with Denmark, Germany has undertaken to extend the railway from Puttgarden to Lübeck, and the final section of motorway between Puttgarden and the mainland. It was agreed in the state treaty that, by the time the tunnel opens, the existing line should be electrified, and should be expanded to two tracks and electrified within seven years.

The German government has provisionally decided to grant a request from the local population about the establishment of a new and better alignment, which takes the railway around the small seaside towns. This means that both double track and electrification will have to be built from scratch and that the railway in Germany can only be completed in 2024.

There is a good development momentum in the Fehmarnbelt region, but the dynamics of regional development can only come if market forces dictate change. And market forces do not always react in time.

Every tier of public management has a responsibility to provide leadership for worthwhile projects. Not just to maintain the momentum, but also to put more focus on development. In addition to the construction project including the landworks, there are three fields that call for decision-making powers:

1) Scandinavian connection to the European network of high-speed rail
2) Realising the significant regional development potential related to major research facilities: ESS (European Spallation Source), MaxIV (Microton Accelerator for X-rays), both of which will be established in Lund with operations also in Copenhagen and DESY (Deutsches Elektronen-Synchrotron) in Hamburg
3) Renewed efforts to realise the "new" border: the Hamburg-Øresund urban corridor

There are initiatives in all three areas, but there is still ample room to maximise opportunities. The Fehmarnbelt link is simply too great a chance to pass up. This applies to the strengthening of the Nordic countries' main crosspoint, the Øresund Region and airport's potential. The aim is to develop and innovate in science and business collaboration along the Hamburg-Øresund urban corridor. It is also about the process of learning about new partnership opportunities currently dormant close to the Fehmarnbelt part of the STRING area (STRING stands for: South Western Baltic Sea Transnational Area Implementing a New Geography.

This political and cross-border cooperation organisation (STRING) consists of dedicated regions with a focus on regional development (Region Scania, Capital Region, Region Zealand, Copenhagen, Schleswig-Holstein and Hamburg). STRING, as a geographical area, already has one of the EU's iconic border regions, the Øresund region, which is the model for many other border regions. With yet another bi and trilateral border region that overlaps much of the Øresund Region, there is an opportunity to create a brand new European model. Whether such a model will be realised depends on public management dynamics, but it must also have popular support. A realistic narrative should be developed that can be understood, one which answers the question: *What's in it for me*?

Global city competition

The world's major cities are struggling to attract investment, tourists and skilled labour. Those in the Fehmarnbelt region are in competition with strong regions, and it is important that we are well placed in the competition. When the distance between the region's cities is changed as dramatically as it will be with the construction of the tunnel under the Baltic Sea, there are new opportunities. The link means the ability and opportunity to transform cities in the region, and give them a stronger position on the world map.

Infrastructure is the basis for urban and regional development. For residents, the infrastructure sets out each city and region's living conditions. For cities and regions to function internally, the framework conditions for their operation must be in order. But for their place in the hierarchy of all other cities and regions, it is about relative position, i.e. the physical possibility of contact between people, companies and institutions in relation to the rest of the world.

People, goods, energy, information and money flow around in the systems that form the infrastructure. People and goods circulate around roads, railways, waterways and airspace, while the energy, water and communications flow in pipelines or through the atmosphere. When it comes to city and regions' potential in the growing mutual competition, it is accessibility that is important. The question is how many other cities and regions can be reached within a given time frame, and how fast, safe, efficient, inefficient, frequent and convenient it is to carry the traffic.

However, companies hold the power when it comes to competitiveness. Therefore, the main focus is on their framework conditions. It is the demand for each city or region's gross product, in terms of the services that companies, institutions, universities, culture and terminals represent, that engenders success, along with the cost of using it, knowledge about its outstanding qualities (i.e. marketing), and the city and the region's demand on all other cities' and regions' product.

Accessibility is therefore a key word when it comes to city and regional success. The same is the position as crosspoint. A city's success is also determined by how central it is located in relation to networks. A city that is a centre for many traffic networks, and has the option of transferring between them, has a strong argument in the competition between cities.

It is important for cities with international ambitions that their crosspoints provide access to all types of networks and that their terminals represent gateways to the "state of the art" network, for example, the European high-speed railway. International service centres and crosspoints interact well.

Fehmarnbelt will create a north European hub

With the tunnel under the Fehmarnbelt and the infrastructure upgrade on both sides of the link, the Nordic countries' main hub will be strengthened – specifically where European and the Scandinavian road and rail systems meet. In addition to a number of important ports, there is also Scandinavia's largest airport and international hub, Copenhagen Airport. The airport offers international accessibility to and from the area. When the tunnel opens, and the railway through eastern Denmark is extended, then the airport's catchment area will be expanded. A larger catchment area brings the opportunity to expand the route network, so access to global markets and international destinations will be expanded further for the benefit of business and the public.

The function as crosspoint will gain new momentum when traffic flows are concentrated in a strong intersection. Such a multimodal crosspoint acts as a localisation magnet for companies that do not really have anything to do with traffic. The improved infrastructure will therefore lead to a flourishing economy: companies locate where access is good. And jobs are created.

The infrastructure also provides the basis for the local or regional catchment area for the people and companies that work and shop in the city and use its offerings. Here, its position in the city hierarchy plays a role. Metropolises compete with other metropolises, for example in air traffic, financial services, research, cultural offerings and high-value production, while cities at other levels in the hierarchy have focused on other things (regional capitals on their own region and towns on their retailing and surrounding area).

Size and economies of scale are key. Size implies specialisation options, cluster development and innovation. The scale and thus the potential synergy between companies and institutions, which have not previously worked together, are determined by the infrastructure opportunities. Volume can be increased through organic growth, but there is also the boost that happens through collaboration with other cities and regions. With the tunnel under the Fehmarnbelt, a number of regions that have not previously collaborated to any degree, will be relatively near each other, which allows collaboration in everyday life.

Common to the three major southern Scandinavian infrastructures is their ability to form a basis for dynamic effects. Their traffic economic effect is especially about the time savings, which can be calculated in traffic economic models. Dynamic effects include changes outside the transport sector, and these cannot be calculated with the same accuracy. It is about market changes, the development of crosspoints and of new agglomeration advantages.

When regions become larger and urban catchment areas grow, new demand is involved. Companies can compete both in their region and in new markets, thus increasing competition between them. A larger labour market will mean greater flexibility while a bigger region will mean more commuters. Travel time savings allow concentration of people and activities on a new, greater scale. It involves economies of scale and clustering.

The extra added value, which will be provided by large, strong clusters has a relatively higher level, compared to that from smaller concentrations. This is due to increased demand for subcontractors, and thus concentration and specialisation of these. They are simply better for conducting business and achieving higher earnings.

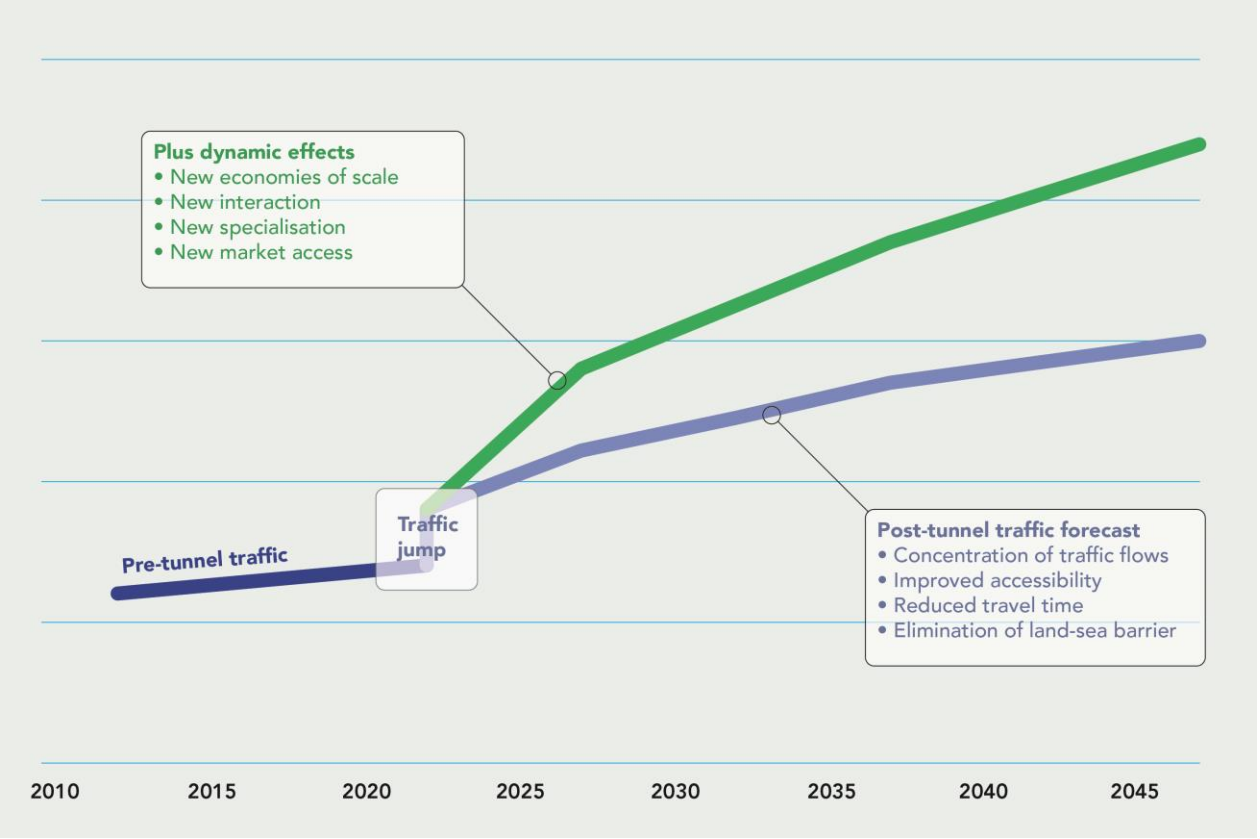
The large scale also means diversity, and diversity encourages innovation. Finally, large scale means that consumption options for people will be expanded. Providers of goods, services and cultural activities can specialise and refine their product.

Realisation of the new opportunities

Northern Germany and the Øresund Region together offer a population of 8-10 million inhabitants, and building stronger links between the areas is certainly realistic. Reduced travel time between the metropolitan areas of Copenhagen-Malmö and Hamburg-Lübeck-Kiel offers great opportunities to develop and innovate in science and business collaborations, to exploit new economies of scale and ensure new specialisations.

When it comes to the regional development project in the Hamburg-Øresund urban corridor, there is still plenty of time to take the important decisions to implement a cross-border project. A successful project, as mentioned, is not only about the new mega construction, but about everything that can happen around the link, about the new synergies and about capitalising on the new opportunities. In short, about optimising the dynamic effects. It is important to put Copenhagen, Malmö, Hamburg, Lübeck and Kiel on the global map as a growth area in which competition with global players is played with a strong hand, and where the win is big.

The reasoning in this paper can be illustrated by a model in which the previous and the expected traffic development in the corridors is complemented by the development, which would be the result of exploiting new opportunities to promote dynamic effects.



The curves illustrate the difference between what can be forecast and further realistic development expectations. Traffic forecasts work on travel time savings, price trends and changes in the barriers. In addition, there is new concentration of traffic flows and changed accessibility. The lower curve in the chart illustrates this. The upper curve describes the regional development and is not about traffic figures – instead it is about value outside the transport sector. When evaluating, it is a question of new economies of scale, new interactions, new specialisation and changed market conditions. Dynamic effects also include new opportunities for innovation and creativity, and are very much a learning process